

WHAT IS CLAIMED IS:

1 1. A method for combining communication beams in a wireless
2 communication system, the method comprising the steps of:
3 receiving a data communication signal on a plurality of antennas forming
4 an antenna array, each of said plurality of antennas producing a received signal
5 as an output;
6 creating N beams from the output received signals, where N is an integer
7 ≥ 2 ;
8 selecting one of said N beams as the primary received signal;
9 selecting at least one of said N beams as an auxiliary received signal;
10 processing said primary received signal and said auxiliary received signal
11 to detect an output message signal; and
12 demodulating said output message signal to detect a binary stream that
13 carries a received message.

1 2. The method of claim 1 wherein said step of selecting the primary signal
2 includes the step of identifying the beam of said N beams in which a desired
3 signal is strongest.

1 3. The method of claim 2 wherein said step of processing said primary
2 received signal and said auxiliary received signal comprises the sub-steps of:
3 assigning weights to each of said primary received signal and said
4 auxiliary received signal; and
5 combining said primary received signal and said auxiliary received signal
6 in accordance with their respectively assigned weights.

1 4. A system for combining communication beams in a wireless
 2 communication system, the system comprising:
 3 an antenna array that includes N antenna elements where N is an integer \geq
 4 2;
 5 an analog beamformer that is coupled to said antenna or antenna elements
 6 array and generates N orthogonal beams;
 7 a switch network that is coupled to the analog beamformer and receives
 8 the N independent beams and provides M output beams where M is an integer
 9 and $1 \leq M < N$;
 10 a primary receiver that is coupled to said switch network and that receives
 11 one of said M beams;
 12 M-1 auxiliary receivers that are coupled to said switch network and that
 13 receive a subset of said M beams; and
 14 a signal processor that is coupled to said primary receiver and said M-1
 15 auxiliary receivers and that produces an output signal from outputs of the
 16 primary receiver and the M-1 auxiliary receivers.

1 5. The system of claim 4 wherein said switch network comprises an
 2 exclusion logic N-to-M switch network.

1 6. The system of claim 4 wherein said switch network is coupled to said
 2 signal processor.

1 7. The system of claim 6 wherein said switch network includes N switch
 2 elements wherein each switch element includes:
 3 M output ports;
 4 a terminating load;

5 a single pole M+1 throw switch coupled to said terminating load and said
6 M output ports; and
7 a switch driver coupled to said single pole M+1 throw switch.

1 8. The system of claim 7 wherein said coupling of said switch network to
2 said signal processor occurs via the switch driver of each of the N switch
3 elements.

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